DOCUMENT RESUME

ED 253 202 IR 011 478

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TITLE Computer Education: A System-Wide Approach.
INSTITUTION Boston Public Schools, Mass.
PUB DATE Dec 83
NOTE 74p.; Paper presented at the Annual Convention of the American Vocational Association (Anaheim, CA, December 2-6, 1983). Some appendices may not reproduce well due to light and broken type.
PUB TYPE Guides - Non-Classroom Use (055) -- Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Computers; *Courseware; Elementary Secondary Education; Guidelines; Newsletters; *Policy Formation; *Program Development; Program Evaluation; *Program Implementation; Purchasing; School Districts; Teacher Education
IDENTIFIERS *Boston Public Schools MA

ABSTRACT

Based on the experiences of the Boston Public Schools (BPS), this document offers guidance in the organization and development of a system-wide approach to an extensive expansion of computer technology. The following topics and steps in the process are addressed: identifying the present status of a school system's computer education program; developing a position paper; establishing a computer-policy committee; identification of priority issues, including funding and professional development; curriculum; software purchase and evaluation; hardware procurement and dissemination; maintenance and security; parent and student activities; allocation of computer equipment; support and instructional personnel; dissemination of information; regional and national contacts; private business and industry involvement; aggressive goals; developing a status report; and future policy recommendations. Appendices comprise a 3-year financial plan; a Computer Onsite Inservice Program Evaluation Checklist; a list of professional development computer courses for 1983-1984; descriptions of sample software programs; a computer implementation action plan; a diagram of the BPS Computer Education Support Personnel organization; a copy of an issue of BPS Computer News; and an article entitled "Boston Schools Launched into the Computer Age." (LMM)

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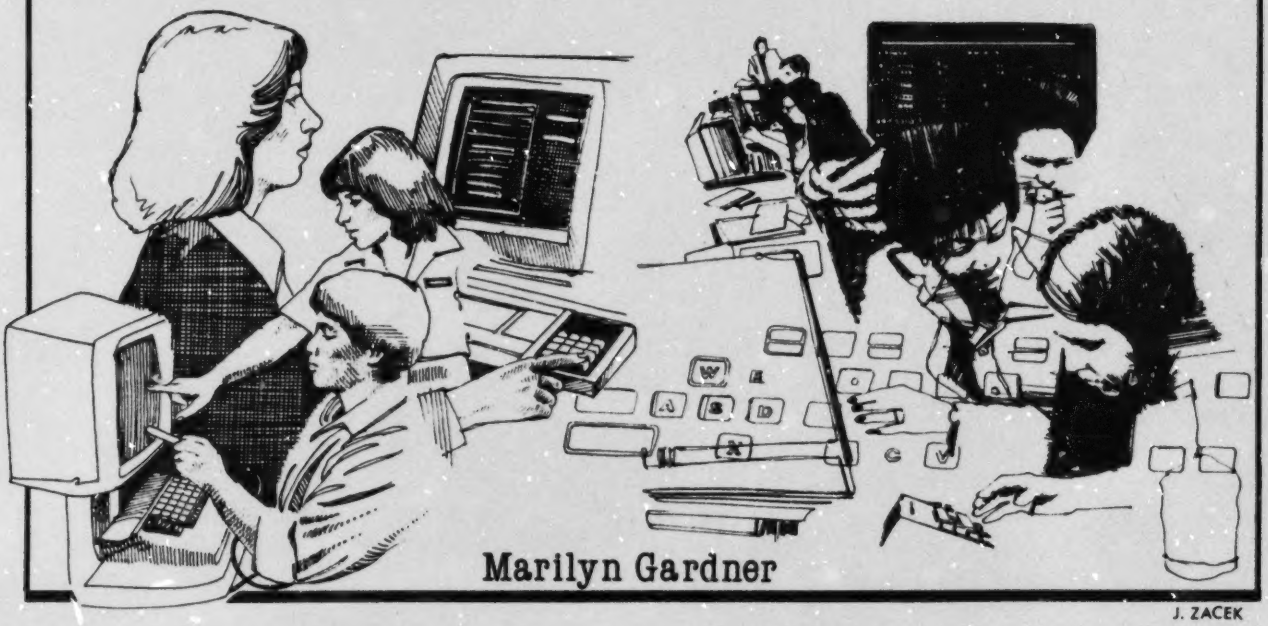
COMPUTER EDUCATION: A SYSTEM-WIDE APPROACH



Marilyn Gardner

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BOSTON PUBLIC SCHOOLS
EDUCATION and EMPLOYMENT

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INTRODUCTION

This document will outline how the Boston Public School system organized its computer technology. It will outline one way to organize a system-wide approach to an extensive expansion of computer technology and to guide a school system in thinking through the process for such development. This document will also outline the activities this large urban school system implemented to guarantee students access to computer technology and will include reference documents, in whole or in part.

IDENTIFYING THE PRESENT STATUS OF A SCHOOL SYSTEM'S COMPUTER EDUCATION PROGRAM

First, identify the present status of computer education in your school system by developing a questionnaire which requests information in these areas:

- o titles of the computer science/data processing courses being taught in the schools and the instructors teaching these courses

- o quantity, type, model and configuration of computer equipment (including main-memory capacity, tape or disk drives, kinds of printers, and video display terminals)

- o instructional areas in which the computers are being used (math, science, language arts)

o time computers are in use (during and/or after school hours)

o linkages with computer people in business/industry/government

o areas in which computer programs are in need of assistance and support

o extent of interest in formation of a professional organization with counterparts

o instructional use of computers

o areas in which new money should be spent

DEVELOPING A POSITION PAPER

Once the survey data have been compiled, organize a professional, albeit social, gathering of persons who have replied. You will find that most of the instructors and administrators are not aware of other computer programs inasmuch as there has not been a coordinated computer-education effort in your school district. The meeting will give teachers an opportunity to share with other computer instructors the programmatic issues they have been grappling with on their own in the past few years. In Boston, we found seventeen independently run computer programs, with no system-wide coordination, even though those programs were impacting 2500 students. Such a meeting would commence a valuable network which would strengthen immeasurably with each subsequent meeting.

During the formal part of the meeting, ask schools to share with the rest of the group their answers to specific questions concerning their programs. Elicit from the group an agreement to develop a position paper, outlining for school administrators the present status of computer education in the system, as well as suggestions for its future direction and scope. The contents of such a document should include the following:

o Introduction

o National and regional outlook (including a regional computer equipment inventory of surrounding school systems and their computer-pupil ratio, as well as a breakdown of equipment allocation in your school system for comparison)

o Problems confronting implementation of computer education in your school district and solutions, if any

o Benefits to be derived from expansion of a computer-education program

o Explanation of the versatility and multiplicity of uses of computers in education

o Resources available, including federal and state funding, as well as business and university partnerships

o Ways in which computer education should be coordinated in your school district

o How to use teachers as primary resources in development of a computer-education program

o Computer budget options

o Suggested major policy recommendations for adoption by the school system

o Outline of a four-year plan for the expansion of computer education in the district

Present the position paper formally to the School Committee, Superintendent, and Senior Officers. Approval of the position paper will initiate the formal beginnings of your district's computer program.

District policy makers should designate one person in the district to be in charge of the coordination of computer education. With the approval and designation of this person, your school district is ready to begin its expansion effort. Without formal designation, of a person in charge, your school district cannot define and coordinate a successful computer program.

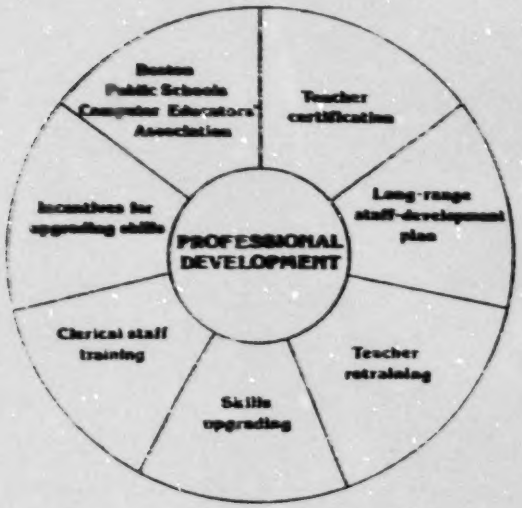
ESTABLISHMENT OF A COMPUTER-POLICY COMMITTEE

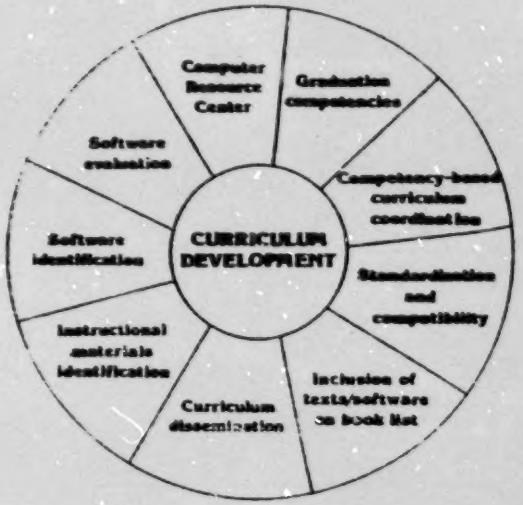
One of the first activities which should be outlined in the four-year plan is establishment of a Computer Policy Committee. This committee should be kept under 25 members and selected from the following areas: school level personnel, Budget, Curriculum, Special Needs, Bilingual, Research and Evaluation, Vocational Education, and Management Information Systems. Teachers should comprise at least forty percent of the committee membership; they will be doing eighty percent of the work.

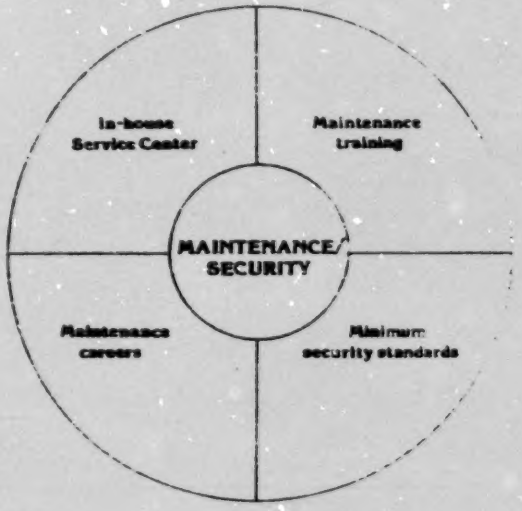
Committee members should identify major priority areas on which to focus. Divide these priority areas into subcommittees to

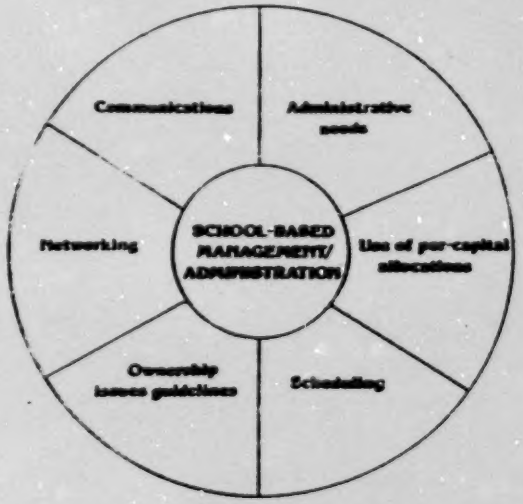
BOSTON PUBLIC SCHOOLS

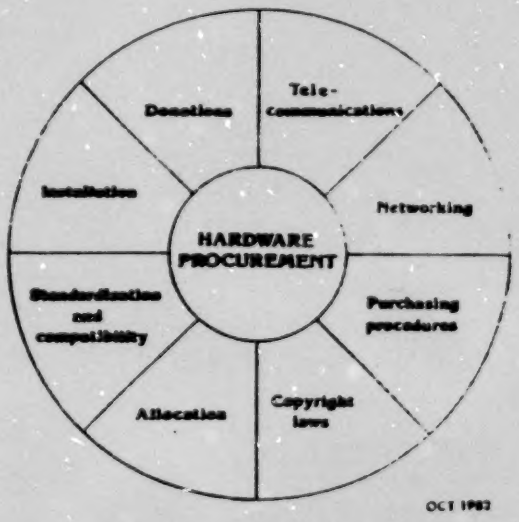
SUBCOMMITTEES OF THE COMPUTER POLICY COMMITTEE











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work on specific issues identified in each area. A breakdown of the subcommittees in Boston Public Schools is attached.

IDENTIFICATION OF PRIORITY ACTIVITIES ON WHICH TO FOCUS

FUNDING

The most crucial component of any computer program is the funding for equipment and software. At the outset, develop a funding plan which offers funding options for the expansion of computer education as did the Boston Public Schools system which developed a three-year funding plan for such an expansion. Boston's overall financial plan is attached for reference as Appendix A. Depending on the school systems timelines and needs, the plan should include:

o Financial breakdown of all projected costs for establishing a computer laboratory in each school in the district consonant with the school district's configuration.

o Funding options including school department, city government, and private industry/business contributions

o Alternative funding scenarios

o Expansion of one of the alternative funding scenarios

o Outline of professional-development activities to answer questions concerning the district's personnel to staff such an ambitious computer-expansion effort

Present the plan to the appropriate school-level personnel in your district. If your plan involves City Hall, involving the Mayor at this time is most valuable.

TABLE A

THREE-YEAR PLAN
FINANCIAL BREAKDOWN

School Year	Equipment	No. Schools Impacted	No. Students Impacted	Installation	Security	Insurance	Maintenance	Professional Development Support Person	No. Teachers Impacted	Software/ Materials/ Supplies	Technical Support Person	Total
1983-84	$1,200,000	(40)	(18,333)	$88,000	$90,000	$4,000	$30,000	$35,000	(400)	$60,000	$18,000	$1,525,000
1984-85	$1,200,000	(40)	(18,333)	$88,000	$90,000	$6,000	$60,000	$35,000	(400)	$80,000	$18,000	$1,577,000
1985-86	$1,200,000	(40)	(18,333)	$88,000	$90,000	$8,000	$90,000	$35,000	(400)	$100,000	$18,000	$1,629,000
TOTAL	$3,600,000	(120)	(55,000)	$264,000	$270,000	$18,000	$180,000	$105,000	(1200)	$240,000	$54,000	
											Grand Total	$4,731,000

After approval from the appropriate parties, develop a strategy involving the business community in the financial-expansion effort.

PROFESSIONAL DEVELOPMENT

Almost as crucial as the funding for equipment and instructional materials is the funding for professional development. In developing its professional-development component, systems can offer teachers free computer training or pay teachers to be trained. It is my suggestion that free training be reserved for introductory level training only and that paying teachers for computer training be abandoned. If given incentives, teachers have the motivation for computer training and will actually pay for this training if it is professionally structured. Following are some professional development incentives and activities structured for Boston teachers:

- o Computer Educators' Association
- o Boston Computer Instructor Certification
- o Free computer workshops and seminars
- o Three-credit graduate courses
- o Linking receipt of computer equipment to staff computer expertise

The Computer Educators' Association

An educational organization devoted to increasing the effectiveness of education through technology, this association provides the broadest possible exchange of computer technology experiences through meetings, publications, and other services. A

five-dollar membership fee, used to fund the annual city-wide computer contest and summer computer camps, and an interest in computer education are the only requirement.

Major activities focus on professional development. Nationally and internationally known guest speakers address the association's general meetings. The Association offers free workshops to members in special areas of interest. Boston boasts 350 members involved in the Association's activities.

Boston Computer-Instructor Certification

Realizing that the Massachusetts State Department of Education had no plans for institution of a computer instructor certification, Boston (one of the first school systems in the country to do so) developed its certification with these objectives:

o insuring that Boston has the qualified staff to implement the extensive computer-expansion effort

o encouraging Boston personnel to retrain in an area where a critical shortage of qualified teachers existed

o providing a city-wide identification of qualified computer teachers from which principals could draw upon

A brief description of the computer-instructor certification requirements include:

o 15 credits in computer education

o a maximum of three credits may be waived if the applicant has computer teaching experience equivalent to three years

o a maximum of three computer in-service credits may be applied towards the fifteen-credit requirement

o a maximum of three credits may be waived if the applicant has experience working in the computer industry for one or more years

o independent study courses must have prior approval

o certification requirements shall be reviewed and upgraded in June, 1984

o courses must comply with the list of approved courses developed by the school system

This certification has been a great incentive for teachers to re-train. It has also been a great opportunity for those teachers who have been looking for renewal in their career. I highly recommend it to any school system.

Free Workshops and Seminars

In order to increase interest and enthusiasm, a school district must be committed to giving a limited number of free workshops. It is important that these workshops be followed with offerings of three-credit graduate courses (which will be described in the next section).

Boston has developed a standardized fifteen-hour (six-two-and-one-half-hour sessions) introductory workshop given in two series. One series requires schools to submit and complete

an application; schools with computer laboratories are eligible to compete with other schools in an application process which requires schools to outline their professional development needs and tell why they should be awarded the fifteen-hour workshop. Teachers must attend all six sessions in order to receive one in-service credit on completion.

The second series of workshops is given on a district-wide basis, each of the nine districts in Boston being allotted one fifteen-hour workshop. The district offices decide what teachers will participate. Of course the number of free workshops offered depends on the size of the school system. In the fall of 1983 Boston offered 25 fifteen-hour workshops. Upon completion of the workshops, all workshop participants must prove competent in specific criterion as outlined in Appendix B.

Three-Credit Graduate Courses

The fifteen-hour introductory workshops act as a feeder system to the three-credit graduate courses that Boston offers its teachers and administrators. All courses are offered at Boston school sites by trained Boston teachers or professors from local universities. Special arrangements are made with local universities to extend the course credits and to reduce standard tuition rates. Teachers pay from $175 to $300 for courses, with no reimbursement by the system. A sixteen-month schedule of the courses that Boston has developed and offers its instructors is attached as Appendix C.

Another incentive to professional development is a Computer Education Master's Degree and an Advanced Degree in Graduate Study through a private college now being offered by Boston. Two groups, already enrolled, will graduate in 1984.

Linking Receipt Of Computer Equipment To Staff Computer Expertise

Schools in Boston must complete Implementation Action Plans(described in detail below) and compete with other schools for computer equipment funding. Schools which have teachers involved in professional development activities are insured that they will receive the financial support to develop their computer programs. Linking equipment distribution to the extent of a particular schools teacher involvement in city-wide computer courses and workshops has been a great incentive to Boston's professional development activities.

CURRICULUM

Computer curriculum from K-12 should be an early priority. Boston has developed what it considers both a core and an elective curriculum.

The core curriculum is a mandated minimum competency curriculum for kindergarten through twelfth grade. It sets forth a realistic minimum expectation for teachers and students on completion of the fifth, eighth and twelfth grades.

Schools adopt the elective curriculum once students have completed the core curriculum. The elective curriculum can be used for special enrichment programs and courses.

SOFTWARE PURCHASE AND EVALUATION

School systems should insist that all software purchases come through a central clearinghouse and be reviewed and approved before purchasing. With limited funds and some poor quality software on the market, such a process insures that teachers and schools are purchasing intelligently.

A school system should not only develop a software list which incorporates the software outlined in the curriculum, but it should catalog all the software purchased by individual teachers and schools. The system should then disseminate this catalog to all computer personnel. By listing the school that purchased the particular software, interested teachers can question previous buyers before purchasing. This catalog should be updated twice a year. A sample sheet from Boston's catalog is attached as Appendix D.

Software evaluation is another priority area that should be addressed. A school system should establish a computer software evaluation team which is responsible for evaluating and recommending software for purchase by the school system. This team, trained in the techniques of software evaluation, should meet several times during the year to identify software that is acceptable for purchase.

HARDWARE PROCUREMENT AND DISSEMINATION

Once the curriculum is developed, intelligent hardware decisions can be made. After carefully studying its financial situation, the school system should review curriculum, using it as a guide for the purchase of hardware.

Purchasing of equipment should be done from a central allocation with the computer coordinator in charge of overseeing its purchase. If the equipment is not to be purchased from a central allocation, schools should be required to complete a form describing how the equipment is to be instructionally used and purchased. This insures that schools are not buying hardware that will not be used properly or that cannot be technically supported by the school system.

Dissemination of equipment should be carefully coordinated to insure its best utlilization. Boston schools requires that schools complete Implementation Action Plans which outline the staff's computer expertise and how the school plans to utilize the equipment. A description of this process will be outlined later on in this document. A sample of the Implementation Action Plan which schools must complete can be found as Appendix E.

MAINTENANCE AND SECURITY

Maintenance

If your school system plans to purchase large amounts of computer equipment at one time, request the vendor to provide one year on-site maintenance. A ninety-day warranty is not long enough to allow a school system to get itself up and running. Boston has found that a vendor will gladly incur this cost to become the sole vendor of a school system for that year.

If your school system is large enough, hire a full-time computer repair technician. After warranty expiration, the salary of the repair technician will be paid for in one year if your school system has more than 150 computers. If your system is too small, consider joining with surrounding school sytems to hire and share a repair technician.

Security

The number one concern of every school system is the security of the computer equipment. To avoid security problems, keep all computer equipment in a computer laboratory. If equipment is to be distributed to individual classrooms, the classroom manager should be required to return the computer to the central location at the end of every day. Make sure the computer laboratories are secured and the equipment anchored to tables with anchor pads.

Equipment loans to teachers should be encouraged on weekends, holidays, and long vacation periods. This not only insures the equipment's security but also improves professional development. The Boston system has not lost one dollar's worth of three-million-dollars in equipment following these security procedures.

PARENT AND STUDENT ACTIVITIES

Boston encourages school-wide parent and student enrichment activities. Activities which a school system might want to consider are:

Computer Contests

An annual computer contest not only stimulates interest and increases computer competition among schools, but can also involve central administration and the school committee.

Computer Camps

Summer computer camps help justify the expensive purchase of computer equipment. Local philanthropic and community agencies will participate in summer computer camps for their agencies' children and/or school system's children. Boston had 600 students involved in computer camps in the summer of 1983, with individual agencies incurring costs and school district personnel running the programs.. All computer camps should be run by school district personnel.

In addition to summer computer camps, Boston uses its school sites for after-school and Saturday camps during the school year. Boston's Saturday computer camps are donated by local business and industry, while local community agencies finance after-school camps.

Parent Activities

Many students do not have home access to computers. In an effort to maximize parent involvement in the computer education of their children, a school system should involve parents in significant ways. Here are several avenues of involvement which you can try in your district and which Boston has found successful.

o Authorize any school with eight or more computers to run a series of workshops for parents during the school year.

BOSTON PUBLIC SCHOOLS

CITY-WIDE COMPUTER CONTEST!

Enter the First Annual CITY-WIDE COMPUTER CONTEST

Develop a program in either of these areas:

1. **EDUCATIONAL GAMES**
2. **GRAPHICS**

Any Boston public high school or middle school student may enter.

PRIZES:

EDUCATIONAL GAMES

1st Prize - $75.00 U.S. Saving Bond
2nd Prize - $50.00 U.S. Saving Bond
3rd Prize - $10.00 Gift certificate
Honorable Mentions

GRAPHICS

1st Prize - $75.00 U.S. Saving Bond
2nd Prize - $50.00 U.S. Saving Bond
3rd Prize - $10.00 Gift certificate
Honorable Mentions

Rules and Regulations

1. Programs must be on disk and run on the Apple II+.
2. A computer print-out of the program must accompany the disk.
3. Directions for accessing and following the program must accompany the program disk.
4. All entries must be received at The Humphrey Center by Monday, April 4, 1983.
5. Program discs will be returned to students at the end of judging.
6. The application below must accompany all entries.
7. All programs must be the work of the student exclusively.
8. A teacher's signature on the application form, indicating that the entry is the exclusive work of the student, must accompany each student entry.
9. Minimal teacher assistance is acceptable.
10. WINNERS will be announced on or before May 9, 1983.
11. Include your name, school, and program title on the disk.

Entry Application

Name: _____ Date: _____

Home Address: _____

Program Title: _____ Brief Program Description: _____

_____

Computer Instructor's Name: _____ School _____

I, _____, assert that the computer program I have submitted in the Boston Public School's CITY-WIDE COMPUTER CONTEST is my own work.

_____ Student's signature

_____ Instructor's signature

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o Run a computer fair for parents showing what is going on in computer education in the school system.

o Develop a formal training program for parents where on completion of a certain number of hours of training, they are eligible to take home computers and software on a loan basis as they do library books.

ALLOCATION OF COMPUTER EQUIPMENT

Deciding the schools which should receive computer equipment is a difficult decision in a large school system.

In Boston, allocation of computer equipment is dependent upon submission of a proposal. Proposals are reviewed on a competitive basis with other schools. There are two funding cycles (fall and spring). Schools interested in receiving computer equipment must submit an Implementation Action Plan, attached as Appendix E.

A committee reviews all proposals and makes equipment allocations. Funding decisions are made on the basis of computer expertise and preparedness of the staff of each school and administrative commitment to support and implement program. Schools encourage staff participation in courses and workshops in order to increase staff interest and compete for computer equipment. This tie between equipment allocation and professional development is crucial.

SUPPORT AND INSTRUCTIONAL PERSONNEL

Support Personnel

BOSTON PUBLIC SCHOOLS

PARENT COMPUTER WORKSHOP

Are you bewildered by the impact computers will have on your life and your children's education? This workshop is for parents who would like to get first-hand information and experience on the uses and applications of computers.

Workshops will be held:

DATES: February 8, February 16, March 1 and March 9

PLACE: The Humphrey Center
75 New Dudley Street
Boston, MA 02119

If you are interested in attending, please complete the form below. All responses will be acknowledged with an acceptance letter and further information forwarded.

Name: _____ Telephone # _____

Address: _____

Name of one child in Boston School _____
Student Name

_____
School

Choose one workshop:

	Date	Time	Number of people
☐	February 8	9 A.M. - 12 P.M.	20
☐	February 16	9 A.M. - 12 P.M.	20
☐	March 1	6 P.M. - 9 P.M.	20
☐	March 9	6 P.M. - 9 P.M.	20

MAIL TO: Marilyn Gardner
The Humphrey Center
75 New Dudley Street
Boston, MA 02119

Support personnel, mandatory for the success of a computer program, provide educational and technical assistance in the implementation of the computer-education curriculum and related activities. A school-wide coordinator for computer education, if the size of the school system warrants it, would work directly with teachers and students. Boston Public School's support personnel configuration is attached as Appendix F. Boston Schools has a student population of fifty-five thousand students.

Instructional Personnel

Instuctional personnel are responsible for the actual instruction of students in computer-literacy competencies. A full-time computer instructor is ideal for a school but realizing the high personnel costs, a school system might want to consider adding computer-education instruction to specific teaching responsibilities of existing teachers. In many cases, these teachers are not specifically computer instructors. Schools should encourage a team approach to computer education suggesting that two or three teachers include computer education in their course of study. Consequently, the success of the computer program will not depend solely on one person using the team approach.

In many schools in Boston, groups of teachers share computer-instruction responsibilities, regardless of their teaching responsibilities. So long as a school insures that the curriculum objectives are being achieved, it does not matter in what subject area or grade levels it is being implemented.

DISSEMINATION OF INFORMATION

School systems often have a difficult time not only disseminating information but in publicizing their activities to the community. A school system should start disseminating information through a monthly computer newsletter. Boston's most recent newsletter can be found as Appendix G. The newsletter should encompass all the activities and plans that are evolving around computer education in the school system.

A slide-tape describing the status of the computer education program can also be helpful. Such an audio-visual demonstration can be used at the beginning of all computer-education meetings and for public relations with community organizations. It should be updated as necessary throughout the year.

Getting your school's computer education activities written up in local newspapers and national magazines is also suggested. Press releases to local newspapers are recommended. National publications will accept well written articles. Your school system should aim to get one lengthy article published in a national magazine or newspaper. Publication of such an article will often cause a domino effect as other national publications will print excerpts from that one article. If a particular point is of interest they will often request that you expand on it. An example of this can be seen in a recent article written by Tech Weekly about Boston Schools(Appendix G). After that article was published, excerpts were printed in five other major national publications.

REGIONAL AND NATIONAL CONTACTS

If one has not already been formed in your region, have your school district form a regional computing consortium, which is valuable for the sharing of information and resources. If you are a small school system, a consortium approach will provide better buying power for group purchases of equipment and software.

There are a number of national organizations that can give your system national exposure and also a perspective of what is going on in computer education. Boston belongs to the Urban Technology Group whose goals includes giving urban school systems around the country an opportunity to share problems and concerns associated with the implementation of a computer-education program. Your school system might consider forming a similar group consisting of cities and towns with common populations and/or goals.

PRIVATE BUSINESS AND INDUSTRY INVOLVEMENT

Private business and industry involvement in computer education can make the difference between a satisfactory computer program and a dynamic one. Develop a private business/industry partnership plan for expansion of computer-education activities. The schools system's superintendent can present the plan to the mayor and a collaboration can become a true partnership with the business community, city hall and the school department. The school system could even work with a local philanthropic or civic organization to coordinate a computer-donation drive. Business'

could be encouraged to "adopt" a school and help that school establish a computer laboratory.

Such a plan should outline the commitment the school system has made in institutionalizing computer education and focus on a series of aggressive goals the system has developed which support the community. Achievement of these goals can be a focal point involving much community activity.

AGGRESSIVE GOALS

Once a school system has a system-wide computer-education program, it is important to look ahead to the continued upgrading and expansion of the computer education program. Plan goals which are farsighted and challenging but within reach and which form the direction, scope, and expansion of the computer education program.

DEVELOPING A STATUS REPORT

After you implement your computer program, prepare a status report outlining the activities to date. Give the reader an opportunity to reflect on the direction and scope of the project, providing school personnel an opportunity to identify areas of concern.

FUTURE POLICY RECOMMENDATIONS

Once the status report is written, the Computer Policy Committee should develop a document outlining future policy

recommendations. These policy recommendations should address the unresolved issues in the major areas of computer education (including personnel, budget, equipment, instructional materials, community use of equipment, curriculum) and should be presented to the appropriate personnel in the following form:

Policy- Outline the policy issue that is to be addressed and describe its present status.

Options- Describe the various options related to the policy issue and outline the advantages and disadvantages of each.

Recommendation- Make a recommendation on how the issue should be handled and describe why this decision was made.

Decision- The final decision is made by the Superintendent and School Committee.

Approval of these policy recommendations should bring closure to any major unresolved organizational and implementation issues.

CONCLUSION

This general guide of one school system's computer-education program is not without imperfections. Through trial and error, however, we consider ourselves to be on the correct path. If only one or two of the above suggestions are useful or helpful to your school system's implementation, then the purpose of this document has been fulfilled.

Good Luck!

Appendix A

BOSTON PUBLIC SCHOOLS

THREE-YEAR FINANCIAL PLAN FOR EXPANSION OF COMPUTER EDUCATION

1983-1986

JANUARY 1983

INTRODUCTION

Presented within the framework of the Three-Year Plan is what many would describe as the key to the future of Boston Public School education. Over the past decade, Boston has maintained isolated computer programs in a few schools. Not until 1982-83 (with the purchase of $300,000 of computer equipment) was the first systematic school-wide effort begun. Well coordinated and standardized, the computer program was formally introduced into seven high schools, five middle schools, and one elementary school.

Although this was a quantum leap forward, still only 8% of Boston's students now have access to computers, with 92%of our student population denied an opportunity to experience the computer's capability. Students are computer illiterate in a job market demanding computer-literate employees.

Boston's urban students do not have home access to computers, as is the suburban situation. Keeping this reality and our students' needs in mind, we developed this three-year financial plan to underline the system's needs and to solicit support for expansion of Boston's computer-education program.

FINANCIAL BREAKDOWN: Over three-year period (TABLE A)

TABLE A outlines a financial breakdown of all costs that would be incurred by expansion of the computer-education program into 120 schools from 1983-1986. Explanations of each catagory follow:

Equipment: The goal of this expansion effort is to install a computer laboratory with 15 stations in every Boston school over the next three years. It is important to note that 15

computer terminals (stations) per school is minimal; two students would share each station. It is also important to remember that individual school enrollments range from 200 to 2500 around the city.

Fifteen stations for 40 schools, or 600 stations, would serve approximately 18,333 students.

Installation: An average installation cost of $2,200 times forty sites amounts to $88,000. This cost remains constant over the three-year peroid.

Security: An average price for security per station is $150. Six hundred stations at $150 = $90,000. This cost remains constant over the three-year period.

Insurance: Insurance is estimated over the three-year period and proportionately increasing over this time span.

Maintenance: An average of $50 per station with six hundred stations = $30,000 for the first year. Maintenance will increase proportionately over the three-year period.

Professional Development and Support Person: A full-time trainer and support person, responsible for supporting existing programs and developing and implementing all professional development activities, is a priority. Salary, estimated at $35,000, will remain constant over the three years.

Software/Materials/Supplies: A $1,500 appropriation for each of the 40 sites must be allocated for software, materials, and supplies. This allocation is a minimum. Schools will need to supply an estimated $1,500 out of other funding sources to adequately supply their computer program for one year. This will remain constant over the three-year period.

TABLE A

THREE-YEAR PLAN
FINANCIAL BREAKDOWN

School Year	Equipment	No. Schools Impacted	No. Students Impacted	Installation	Security	Insurance	Maintenance	Professional Development Support Person	No. Teachers Impacted	Software/ Materials/ Supplies	Technical Support Person	Total
1983-84	$1,200,000	(40)	(18,333)	$88,000	$90,000	$4,000	$30,000	$35,000	(400)	$60,000	$18,000	$1,525,000
1984-85	$1,200,000	(40)	(18,333)	$88,000	$90,000	$6,000	$60,000	$35,000	(400)	$80,000	$18,000	$1,577,000
1985-86	$1,200,000	(40)	(18,333)	$88,000	$90,000	$8,000	$90,000	$35,000	(400)	$100,000	$18,000	$1,629,000
TOTAL	$3,600,000	(120)	(55,000)	$264,000	$270,000	$18,000	$180,000	$105,000	(1200)	$240,000	$54,000	
											Grand Total	$4,731,000

Technical Support: A full-time software and equipment technical-support specialist must be hired. This person's job would be to troubleshoot program, software, and mechanical problems reported from the 120 sites. His/her position is estimated at $18,000. This cost would remain constant over the three-year period.

TOTAL

Implementation Cost

year 1	$1,525,000
year 2	1,577,000
year 3	1,629,000

For the grand total of $4,731,000, every Boston Public School student will have access to computers by 1986. This access will insure students successfully completing computer-technology competencies by the end of the fifth grade, the eighth grade, and the twelfth grade (a graduation computer competency).

Fiscal Breakdown of 1983-84 School Year (TABLE B)

A closer view of the plan for the 1983-84 school year indicates that Boston Schools will be capable of impacting 40 schools, 18,333 students, and 400 teachers.

Funding Options: (TABLE C)

Option 1. Boston Public Schools and the City of Boston could take on sole responsibility for the purchase of computer equipment using federal, state, city, and school department funds. Boston Public Schools would also make an in-kind contribution to carry the costs for maintenance, site preparation, staffing, training, technical support, and software and materials.

TABLE B

FISCAL BREAKDOWN OF 1983-84 SCHOOL YEAR

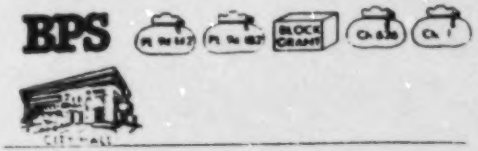
EQUIPMENT	INSTALLATION	SECURITY	INSURANCE	SOFTWARE/ MATERIALS/ SUPPLIES	SUPPORT PERSONNEL	MAINTENANCE	TOTAL
$1,200,000	$88,000	$90,000	$4,000	$60,000	$53,000	$30,000	$1,525,000

IMPACT

40 SCHOOLS	18,333 STUDENTS	400 TEACHERS

TABLE C

BPS COMPUTER EDUCATION DEVELOPMENT OPTIONS

OPTION 1	OPTION 2	OPTION 3
BPS/City Hall combined purchase and deployment of microcomputers	Donation of equipment by Massachusetts' Computer Manufacturers	Partnership between Boston Public Schools, City Hall and the Business Community
Combined effort of BPS and City Hall 	Donation of equipment and technical training by Industry	All three partners would share the cost of equipment and technical training
BPS contributions and responsibilities Maintenance Site preparation Personnel/Staffing Staff training/development Technical support Software/Materials/Supplies	BPS contributions and responsibilities Maintenance Site preparation Personnel/Staffing Staff training /development Technical support Software/Materials/Supplies	BPS contributions and responsibilities Maintenance Site preparation Personnel/Staffing Staff training/development Technical support Software/Materials/Supplies

Option 2. Major equipment donations could be made by Massachusetts' computer manufacturers and Boston's businesses and industries. Boston Public Schools' in-kind contribution could be to carry the cost of maintenance, site preparation, staffing, training, technical support, and materials and supplies.

Option 3. This is a partnership among Boston Public Schools, City Hall, and the business community, with each contributing a percentage of the cost for equipment and services.

Funding Scenarios (TABLE D)

If we were to chose Option 3 (partnership between Boston Public Schools, City Hall, and the business community), we could derive a number of funding scenarios.

The funding scenarios on Table D outline the cost breakdown for a series of partnership agreements. As one can note, all three partners have equal shares of responsibility for the expansion effort.

Breakdown of Scenarios (TABLE E)

A breakdown of Scenario 1 from Table D indicates the possible sources of funding.

CONCLUSION

Boston Public Schools are ready to implement this three-year financial plan for expansion of computer education.

Boston Public Schools have all of the following:

> A solid framework upon which to build. Preparing since 1980, our present success is evidenced by our existing computer programs.

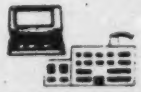
TABLE D

FUNDING SCENARIOS
1983-84 SCHOOL YEAR

SCENARIO 1 40 Schools Impacted 18,333 Students Impacted			SCENARIO 2 40 Schools Impacted 18,333 Students Impacted			SCENARIO 3 40 Schools Impacted 18,333 Students Impacted		
Funding Source		Cost	Funding Source		Cost	Funding Source		Cost
Boston Public Schools	Equipment	$300,000	Boston Public Schools	Equipment	$400,000	Boston Public Schools	Insurance	$4,000
	Installation	88,000		Insurance	4,000		Maintenance	30,000
	Insurance	4,000		Maintenance	30,000		Personnel	53,000
BPS	Maintenance	30,000		Personnel	53,000		Installation	88,000
	Personnel	53,000					Security	90,000
	Software/ Materials/ Supplies	60,000					Materials/ Supplies	60,000
	Total	$535,000		Total	$487,000		Total	$305,000
City Hall	Equipment	$450,000	City Hall	Equipment	$300,000	City Hall	Equipment	$600,000
	Security (Public Facilities)	90,000		Installation	88,000			
				Security	90,000			
	Total	$540,000		Total	$478,000		Total	$600,000
Business/ Industry	Donation of Equipment	$450,000	Business/ Industry	Donation of Equipment	$500,000	Business/ Industry	Donation of Equipment	$600,000
				Materials/Supplies	60,000			
	Total	$450,000		Total	$560,000		Total	$600,000
GRAND TOTAL		$1,525,000			$1,525,000			$1,525,000

TABLE E

BREAKDOWN OF SCENARIO 1

	ITEM	COST	SOURCE
Boston Public Schools BPS	Equipment	$300,000	Chapter 1, Block Grant, 94, 482, 94-142, Chapter 636, etc.
	Installation	88,100	Planning/Engineering
	Insurance	4,000	Central Office
	Maintenance	30,000	School Based/Central Office
	Software/Materials	60,000	School Based/Central Office
	Support Personnel	53,000	Central Office
	TOTAL	$525,000	
City Hall	Equipment	$450,000	Mayor's Office
	Security	90,000	Public Facilities
	TOTAL	$540,000	
Private Business/Industry 	Equipment (Donation)	$450,000	Private Business/Industry
	TOTAL	$450,000	
	GRAND TOTAL	$1,525,000	

A Computer Policy Committee consisting of key administrators and teachers who have established policies and procedures for future expansion and who are prepared to make incisive and forthright decisions.

The Computer Educators' Association's 200 members who are ready to support this plan and are dedicated to increasing the effectiveness of education through technology.

In-house technical expertise.

The University Task Force which has developed and is implementing in the winter and spring of 1983 a model for professional development that should be emulated nationally.

Hundreds of teachers and administrators who have pledged the inordinate amount of time and energy necessary to insure the success of this plan. This is partially evidenced in Table F. From January through June 1983, Boston Public School teachers and administrators will spend over $67,000 in preparing themselves for this expansion effort. This figure takes into account only the money expended in the 12 computer courses Boston schools have offered to Boston personnel in the winter and spring of 1983. There is no way of calculating the thousands of dollars teachers are spending at universities on courses unrelated to Boston's program during the same time span.

With such a combination, yes, the Boston Public School System is ready for the task before it, given the adequate resources to fund such a program. The framework is set. Society's reward is self-evident. We are confident we will be able to look back at some future date, secure in the knowledge that we did the right things at a time when critics said it couldn't be done at all.

TABLE F

PROFESSIONAL DEVELOPMENT ACTIVITIES

JANUARY-JULY 1983

COURSE TITLE	UNIVERSITY AFFILIATION	Number of Boston Teachers/ Administrators	Number of Credits	TIME SLOT	COST	Total Financial Outlay by Teachers/Administrators
Introduction to Computers in Education	Lesley College	22	3	Jan-April	$300	$6,600
Introduction to Computers in Education	Lesley College	20	3	Jan-April	$300	6,000
Introduction to Computers for High School Educators	Bridgewater State College	40	3	Jan-May	$190	7,600
Introduction to Computers for Middle School Educators	Bridgewater State College	20	3	Jan-May	$190	3,800
Introduction to Computers for Elementary Educators	Bridgewater State College	20	3	Jan-May	$190	3,800
Basic Programming	Lesley College	24	3	Jan-April	$300	7,200
Professional Uses of Computers in Education	Northeastern University	17	4	Jan-May	$400	6,800
Computers in Education	Lesley College	20	3	June-July	$300	6,000
LOGO	Lesley College	40	3	May-June	$300	12,000
Introduction to Computer Literacy	Lesley College	20	3	June-July	$300	6,000
Basic Programming	University of Massachusetts	13	3	Jan-May	$150	1,950
Total		256				$67,750

Appendix B

INSTITUTE FOR PROFESSIONAL DEVELOPMENT
Boston Public Schools

Barbara Locurto, Senior Coordinator, 726-6200, X5694

COMPUTER ONSITE INSERVICE PROGRAM

EVALUATION CHECKLIST

PARTICIPANT'S NAME _____

MINIMUM DEMONSTRATED COMPETENCIES USING THE MICROCOMPUTER:
TRAINER WILL DATE ALL BLANKS (___) INDICATING THAT EACH COMPETENCY HAS BEEN DEMONSTRATED SATISFACTORILY.

1. COMPUTER HARDWARE

___ Assemble/disassemble microcomputer/peripherals:disk drive(s), disk controller card, monitor, printer, (16K RAM card, if Apple II Plus)
___ Turn computer on/off in proper order
___ Identify/define ROM/RAM, DOS 3.2/DOS 3.3
___ Use tutorials:Apple Presents Apple, Know Your Apple, Sample Programs (4)
___ Demonstrate proper use, care and maintenance of computer, its parts, and its immediate environment according to the Owner's Manual and TRAINER's instructions.

2. SYSTEM MASTER (DOS 3.3.)

___ Start up (BOOT), cold and warm
___ Use DOS commands:
CATALOG, LIST, RUN, BRUN, LOAD, BLOAD, SAVE, NEW, HOME, LOCK, UNLOCK, DELETE, RENAME, PR, INT, PR#

___ Back up (COPY) System Master using:
COPYA
FID (any 3 files)
MUFFIN
___ INITialize a blank disk
___ Stop a program safely (3 ways)

___ Identify:3 types of prompts, cursor, file types, slot, drive, track, sector
___ Identify/recognize DOS error messages: syntax error, ?syntax error, ***syntax error, language not available, write protected, file locked, file not found, file type mismatch, disk full, I/O error, out of memory
___ Demonstrate proper care of disks: insert, remove, write protect, label, store, handle

3. SOFTWARE

___ Demonstrate use of several types of software: tutorial, simulation, drill and practice, game, CAI, CMI, and others as selected by TRAINER

4. WORD PROCESSING

___ Use tutorial and/or TRAINER's handouts
___ Edit 100 word text as provided by TRAINER (make all necessary changes, corrections, insertions, deletions)
___ Print edited text onto hard copy -- attach printer and interface card into standard slot

5. PROGRAMMING

___ Demonstrate ability to write SIMPLE programs/procedures which RUN successfully. Assignments and criteria will be provided by TRAINER

TRAINER's signature
of verification _____

Appendix C

BOSTON PUBLIC SCHOOLS

PROFESSIONAL DEVELOPMENT COMPUTER COURSES

SEPTEMBER 1983-DECEMBER 1984

COURSE	# OF SECTIONS	UNIVERSITY	# OF TEACHERS
SEPTEMBER 1983-DECEMBER 1984			
Introduction to Computers for the Elementary School Educator	2	Lesley Bridgewater	35
Computers and the Special Needs Student	1	U. of Mass.	15
Introduction to Computer Structure	1	U. of Mass.	22
Management and Administrative Uses of Computers	1	U. of Mass.	22
Computers in the Schools	1	Lesley	20
Logo	2	U. of Mass. Lesley	35
Pascal	3	U. of Mass. Lesley	35
Computer Applications	1	Bridgewater	18
BASIC	1	U. of Mass.	22
Introduction to Computer Literacy for Middle School Educators	1	U.of Mass.	22
Introduction to Computer Literacy for High School Educators	1	U. of Mass.	15

January 1984-May 1984

Pascal	2	U. of Mass.	40
Management and Administrative Uses	1	U. of Mass.	20
Logo	1	Bridgewater	20
Introduction to Computer Literacy for Elementary Educators	1	U. of Mass.	20
Introduction to Computer Literacy for Secondary Educators	1	U. of Mass.	20
Classroom Applications	1	Bridgewater	20
Computers and the Special Needs Student	2	Lesley Bridgewater	40
Educational Software: Evaluation and Design	1	U. of Mass.	20
Introduction and Development of Educational Information Systems	1	U. of Mass.	20
BASIC	2	U. of Mass.	40
Survey of Computer Languages for the Classroom Teacher	1	U. of Mass.	20
Logo II	1	Lesley	20
Computer Simulations	1	Lesley	20

Summer 1984

Introduction to Computer Literacy for Educators	2	U. of Mass.	40
Logo	2	Bridgewater	40

Computer Applications	1	Bridgewater	20
BASIC	2	U. of Mass. Lesley	20
Management and Administrative Uses of Computers	1	U. of Mass.	20
Computers and The Special Needs Student	1	Lesley	20
September 1984-December 1984			
Lego	1	Bridgewater	20
Introduction to Computer Literacy for the Elementary Educator	1	U. of Mass.	20
Introduction to Computer Literacy for the Secondary School Educator	2	Lesley U. of Mass.	40
Pascal	2	U. of Mass. Lesley	20
Management and Administrative Uses of Computers	1	U. of Mass.	20
Introduction to Computer Structure	2	U. of Mass.	40
Educational Software: Evaluation and Design	4	U. of Mass.	40
Computers and the Special Needs Student	1	Bridgewater	20
Survey of Computer Languages for the Classroom Teacher	1	U. of Mass.	20
Introduction and Development of Educational Information Systems	1	U. of Mass.	20
BASIC	2	U. of Mass.	40

Appendix D

TITLE: ELEMENTARY (Volume 7)

PUBLISHER: Minnesota Educational Computing Consortium

PUBLISHING DATE: 1980, Revised August, 1981

EQUIPMENT: Apple II+, 48k, One Disk Drive

COST: Duplication by The Humphrey Center free of charge, diskette to be provided by school. Licensed for duplication (see page 1).

GRADE LEVEL: K-2 (see description)

LOCATION OF ORIGINAL: The Humphrey Center

DESCRIPTION:

CATERPILLAR - A drill on the upper case alphabet.

TRAIN - A drill on the lower case alphabet.

SOUNDS - A drill on the initial letter used to spell a pictured word.

PICTURES - A concentration type of memory game using pictures.

WORDS - A concentration type of memory game using words.

SHAPES - A concentration type of memory game using colored geometric shapes.

SMILE - A drill on counting identical objects using the numbers 1 - 9.

PUZZLE - A drill on counting objects in a group of mixed shapes.

SPACESHIP - A drill on addition of two groups of identical objects using sums of 1 through 10.

TITLE: ENGLISH (Volume 1)

PUBLISHER: Minnesota Educational Computing Consortium

PUBLISHING DATE: 1980

EQUIPMENT: Aplle II+, 48K, One Disk Drive

COST: Duplication by The Humphrey Center free of charge, diskette to be provided by school. Licensed for duplication (see page 1)

GRADE LEVEL: 3-7

LOCATION OF ORIGINAL: The Humphrey Center

DESCRIPTION:

This module provides diagnostic drills and tutorials on parts of speech including nouns, pronouns, adjectives, adverbs, verbs, conjunctions, and interjections. A teacher option to create tests is also available. The support booklet describes classroom use of the module and lists sentences used in drills.

TITLE: ELEMENTARY (Volume 7)

PUBLISHER: Minnesota Educational Computing Consortium

PUBLISHING DATE: 1980, Revised August, 1981

EQUIPMENT: Apple II+, 48k, One Disk Drive

COST: Duplication by The Humphrey Center free of charge, diskette to be provided by school. Licensed for duplication (see page 1).

GRADE LEVEL: K-2 (see description)

LOCATION OF ORIGINAL: The Humphrey Center

DESCRIPTION:

CATERPILLAR - A drill on the upper case alphabet.

TRAIN - A drill on the lower case alphabet.

SOUNDS - A drill on the initial letter used to spell a pictured word.

PICTURES - A concentration type of memory game using pictures.

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SHAPES - A concentration type of memory game using colored geometric shapes.

SMILE - A drill on counting identical objects using the numbers 1 - 9.

WUZZLE - A drill on counting objects in a group of mixed shapes.

SPACESHIP - A drill on addition of two groups of identical objects using sums of 1 through 10.

Appendix E

BOSTON PUBLIC SCHOOLS
COMPUTER IMPLEMENTATION ACTION PLAN

SCHOOL/DEPARTMENT:_____

ADDRESS:_____ PHONE_____

DATE:_____ CONTACT PERSON:_____

I. PROGRAM DESCRIPTION: (Specify sites if more than one school)

II. OBJECTIVES FOR THE PROPOSED PROGRAM:

III. TARGET POPULATION: (Total by grade level)

IV. STAFFING: (Include instructors who will train and use equipment)

V. PROVISIONS FOR STAFF TRAINING: (Explain current proficiency, past and future in-service training)

VI. HARDWARE REQUESTED: (Prices quoted are approximations)

Number		Unit Cost	Total Cost
_____	Computer Unit	$1,400	_____
_____	Printers	500	_____

OTHER (Please describe specifically)

Number	Description	Unit Cost	
____	_____	_____	_____
____	_____	_____	_____
		Grand Total	_____

VII. TYPE(s) OF APPLICATIONS TO BE IMPLEMENTED:

____	drill and practice	_____	programming
____	tutorial	_____	data management
____	simulation	_____	classroom management
____	problem solving	_____	word processing

VIII. SOFTWARE MATERIALS AND SUPPLIES:

Schools must allocate a minimum of 10% of total equipment cost for software, materials and supplies. Money for these necessities must be provided by the school requesting computer equipment. (Please specify amount and funding source)

$_____
(minimum of 10% of equipment Grand Total)

_____
Funding Source

IX. PROGRAMS (software) TO BE USED BY TYPE(s) OF APPLICATIONS LISTED ABOVE: (This cost must be incurred by the school)

NUMBER/DESCRIPTION	UNIT COST	TOTAL COST
____ Blank floppy disks (minimum of 10 boxes needed to start program)	$25/box	_____
____	_____	_____
____	_____	_____
____	_____	_____
____	_____	_____

X. PROPOSED LOCATION FOR EQUIPMENT: (Where will the equipment be physically located? How will this equipment be used to supplement existing hardware?)

XI. SCHEDULING PLAN: (Describe how students will be scheduled to use the computers)

XII. Describe what group or agencies (e.g., business partner, university partner, parent group, community organization, private industry) will offer support and assistance to your computer program. A letter from this group or organization, describing its activities if your proposal is funded, must accompany this application.

XIII. ADDITIONAL COMMENTS: Please respond with any information which might facilitate the Committee's decision regarding this application.

REVIEWED BY: _____ _____
Computer Liaison Date

SUBMITTED AND APPROVED BY: _____ _____
Principal/Headmaster Date

APPROVED BY: _____ _____
District Superintendent Date

REVIEWED BY: _____ _____
Policy Committee Date

APPROVED BY: _____ _____
Policy Committee Date

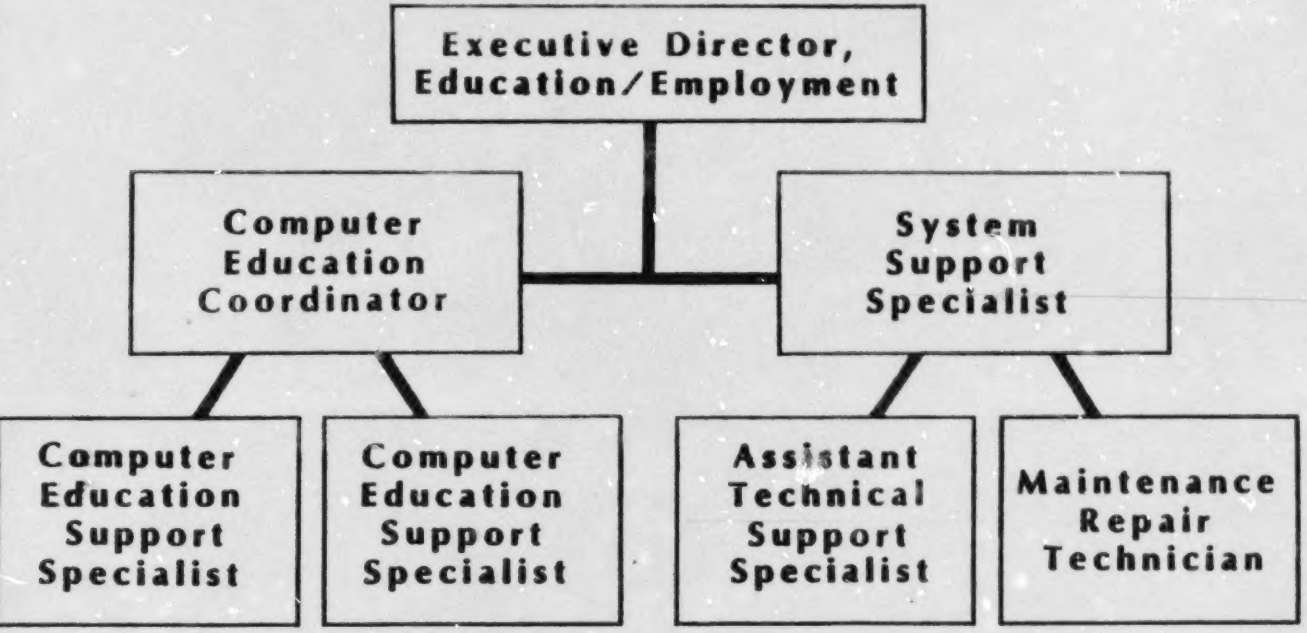
MAIL TO:

MARILYN GARDNER
THE HUMPHREY CENTER
75 NEW DUDLEY STREET
BOSTON, MA 02119

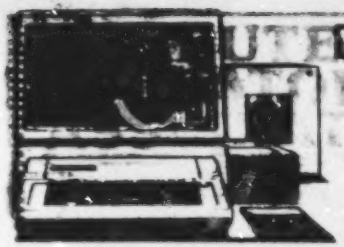
Appendix F

TABLE F

BOSTON PUBLIC SCHOOLS
COMPUTER EDUCATION SUPPORT PERSONNEL



Appendix G



Computer Courses Galore!

Fifteen three-credit computer courses are being offered to Boston teachers and administrators this fall. The courses, held in computer laboratories of Boston schools after school hours, are accredited by the University of Massachusetts, Bridgewater State College, and Lesley College. Courses range from introductory computer to more advanced computer structure for the more experienced. A sixteen-month schedule of computer courses to be offered through the fall of 1984 will be available in early October. See your headmaster for a copy of the course listings.

Computer Camps

Boston Schools' computer camps were a huge success during the summer, 1983. Over 600 Boston children attended camps at the Shaw, Wheatley, Wilson, Taft, Edwards, the Humphrey Center, Copley High, and East Boston High. Boston Schools' ambitious goals are to establish twenty computer camps during the summer of 1984 and to study the feasibility of weekend computer camps during 1983-84.

Computer Outlook

Computers started arriving in the schools during the third week of August and computer equipment deliveries to eighty-nine schools were completed in September. Due to asbestos removal by Planning and Engineering, the wiring of computer laboratories is understandably a few weeks behind schedule. Planning and Engineering has assured us, however, that all wiring will be completed by October 14. If you have concerns about your school's wiring and security, please contact Rob Roy at 726-6200, ext. 5265.

FOR THOSE WHO HAVE NOTHING

A brief proposal cycle has been initiated for those schools with only one computer or no computers at all. We are trying to reach those schools which did not or could not submit proposals last January, in addition to schools that received only one computer during the last funding cycle. Approximately forty schools are eligible to submit proposals which are due October 15, 1983. Limited funds are available, so schools which clearly have the personnel and enthusiasm to implement a school-wide program this fall need not wait an entire year for the 1984-85 funding cycle.

BPS COMPUTER NEWS

ISSUE #8 _____ OCTOBER 1983

ARE YOU COMPUTER CERTIFIABLE?

A Boston Public School Computer Instructor Certification has been approved by the School Department and will take effect as of July, 1984. The requirements for this certification are outlined in Personnel Circular #1.

Application for certification will not be accepted until Jan. 1, 1984. It is important to note the following:

1. Independent study courses must have a prior approval.
2. Certification requires a minimum of six credits in computer programming and a maximum of six credits in computer science.

Approval courses under these two categories are outlined in Personnel Circular #1.

All computer courses offered through the school system can apply towards the Boston Public School Instructor Certification.

BEST COPY AVAILABLE

COMPUTER EDUCATORS' ASSOCIATION

The first meeting of the Computer Educators' Association for the 1983-84 school year will be held:

DATE: October 26, 1983
TIME: 4:30 - 5:00
Business Meeting
5:00 - 6:00 Cocktails and hors d'oeuvres
6:00 - 7:00
Keynote Speakers
PLACE: Kennedy Library

The keynote speakers will be Dr. Robert Spillane and Dr. Seymour Papert. A three-dollar renewal fee will be collected from former members and a five-dollar membership fee will be collected at the door from new members. All membership fees are applied towards Boston Public School computer contest and computer camp activities. We hope to see you there.

WHERE ARE WE?

The Computer Education Task Force's report on the present status of computer education in Boston schools will be mailed to every school in November. This report documents all the computer-focused activities and projects presently implemented in Boston schools.

Help is on the Way!

Three new positions have been added to support the implementation of computer education in Boston Schools. Two Computer Education Support Specialists and a Maintenance Repair Technician have been hired to help schools develop computer programs and maintain equipment.

The Computer Education Support Specialists and their district responsibilities are:

ANN GRADY: Districts 3, 5, 7, 8, 9, Latin School, Latin Academy, Boston Technical, and Copley.

JOAN WILLIAMS: Districts 1, 2, 4, 6, all high schools except Latin School, Latin Academy, Boston Technical, and Copley.

They will be contacting your school shortly to offer assistance, answer questions, or respond to any concerns you might have.

GREG GALLAGHER, Maintenance Repair Technician will contact you concerning the process for maintaining and repairing computer equipment.

CURRICULUM

Boston Public Schools' computer literacy curriculum is seperated into a core curriculum and an elective curriculum. The core curriculum available for pilot testing October 15, 1983 is a minimum competency curriculum for kindergarten through twelfth grade. This core curriculum requires that students attain a certain level of competency upon completion of the fifth, eighth, and twelfth grades. Each school must certify that the students who have completed these three grades are competent in the the tasks outlined in the core curriculum.

The elective curriculum to be piloted in the fall of 1984 will be for students who have successfully completed the core curriculum at grade 5, 8, and 12 levels. Once a school has successfully scheduled students through the core curriculum, the elective curriculum can be used for special programs and courses the school wishes to offer.

When you receive the core curriculum in early October, we ask that computer teachers please review and let us have the benefit of their critical analysis. We hope that interested teachers and administrators will spend the time to help us develop a computer literacy curriculum that is most comprehensive and far-reaching and a credit to the city of Boston.

QUESTIONS ABOUT THIS NEWSLETTER??? Contact Marilyn Gardner, Tel. 442-5200 (Ext. 571)
Newsletter edited by Mary Aylward Stewart, Design by Joe Zacek (The Humphrey Center, 75 New Dudley St., Boston, MA 02119)

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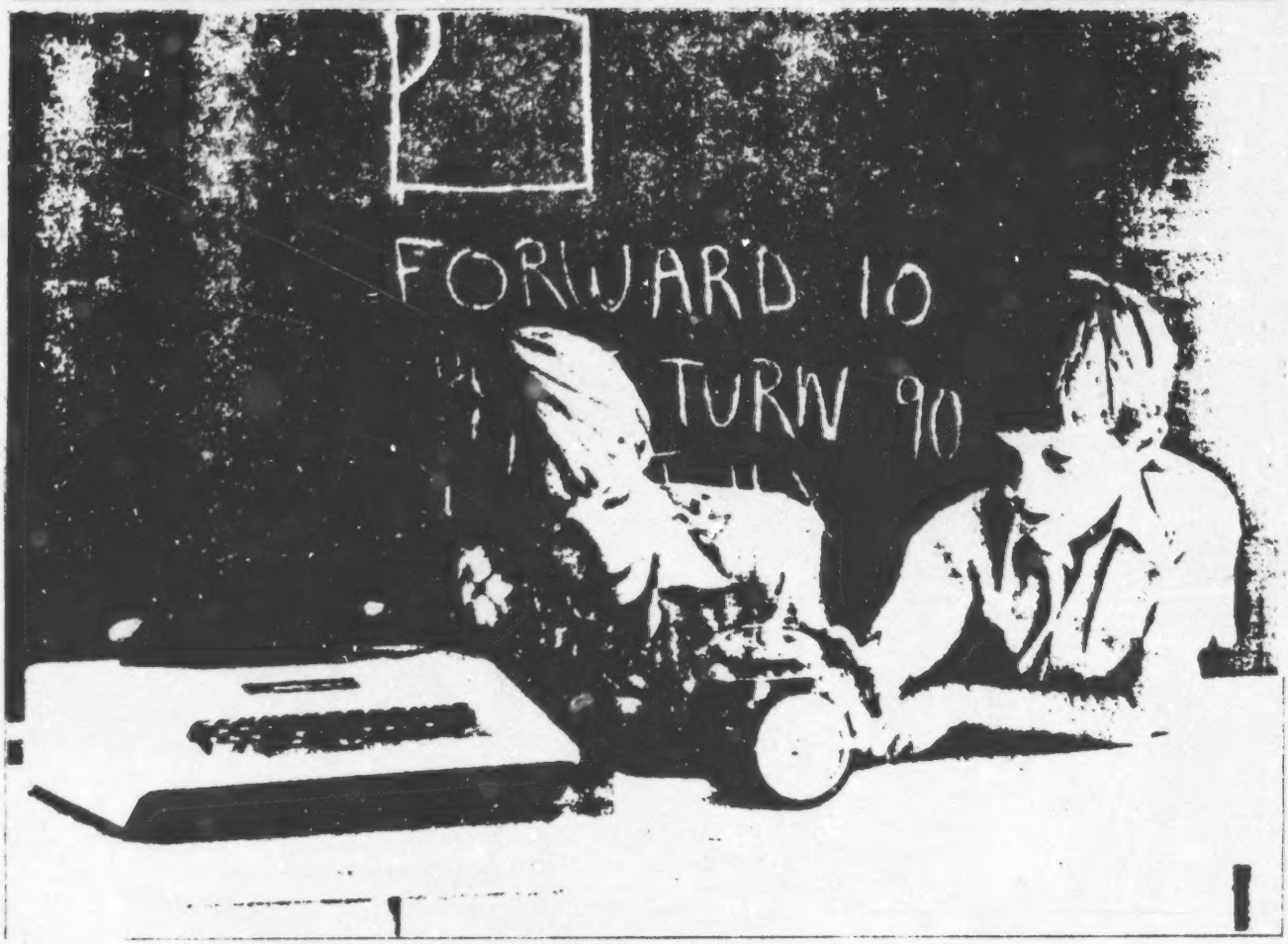
Appendix H



Boston Schools Launched Into Computer Age

"Whose kids get to learn in front of computers? And will computer literacy split the present and future generations of American school children into the rich and the poor?"

Frank R. Lautenberg, America's high tech guru in the United States Senate, asked these questions in a June speech and the wake is still washing over the country's public education pundits.

It's beginning to look like a moot question for the kids in Boston, however, for its school system is ready with a well-financed answer: a $4.7 million program that will make computers available for every one of 55,000 K through 12 students by the end of the 1985-86 school year. Called "A Three-Year Financial Plan for Expansion of Computer Education 1983-1986," this ambitious scheme has as its target a computer lab with at least 15 stations for each of the 120 schools in the system.

Funding is a three-way partnership in almost equal amounts between Boston Public Schools (BPS), Boston City Hall and Boston-area private business industry. The computer education plan, detailed here in its entirety for the first time, addresses squarely Lautenberg's widely reported remarks.

In early June on the floor of the U.S. Senate the freshman Democrat from New Jersey, founder of Automatic Data Processing, the largest company of its kind in the nation, said he and his partners were aware that children in large, poor urban districts such as Newark, NJ, were falling behind in computer training and so were not getting their share of jobs in the industry.

On June 24, in an interview in the *New York Times*, Lautenberg added: "Federal cutbacks in education aid are helping to widen the gap. The wealthier districts find a way to go ahead with computer purchases, while the poor districts cannot."

The Boston school system, not known in recent years for its astute reading of the political winds, caught on quickly to the implications of those fears. In Boston, a veritable hub of computer activity, the school system saw a guaranteed opportunity to appear progressive. Perhaps children from more privileged homes could be lured back into the public school system. Business and taxpayers might be more willing to underwrite a system that appeared to be keeping pace with the technology, and its

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job-training issues of tomorrow.

Thanks to the farsightedness and two years of hard work by BPS personnel such as Marilyn Gardner, computer education coordinator, Boston now seems in little danger of joining the Newarks of America as the computer education have nots. The three-year program, described by BPS educators as the key to the future of Boston public school education, is putting its money where its computers are going to be. For example:

*Equipment, $1.2 million per year for three years, for a total of $3.6 million.

*Installation, $88,000 per year for three years, for a total of $264,000.

*Security, $90,000 per year for three years, for a total of $270,000.

*Maintenance, $30,000 in 1984-85; and $90,000 in 1985-86, for a total of $180,000.

Also budgeted for three years at a salary of $35,000 per year is a professional development support person, and at $18,000 salary per year a technical support person. Hiring the professional development support person is designated "high priority" in the report. This person will be responsible for supporting existing programs and developing and implementing all professional development activities.

In each of the three school years, 40 schools, 18,333 students and 400 teachers will be affected. By the end of the 1985-86 school year, the entire system of 120 schools, 1200 teachers and 55,000 students will have access to and be training on between 2500 and 3000 terminals.

The $4.7 million budget breaks out this way over the three years:

*Year One, $1,525,000.

*Year Two, $1,377,000.

*Year Three, $1,629,000.

This is how the three-way partnership funding breaks down for 1983-84:

BPS puts up $335,000 and is responsible for supplying some of the equipment, installation, insurance, maintenance, software/materials and support personnel. Part of this funding comes from federal block grants.

City Hall puts up $540,000 and is responsible for some of the equipment and security.

Private industry/business puts up $450,000 in the form of donated equipment and/or funds.

The three year program is an outgrowth of BPS's first school-wide systematic computer literacy program during the school year just ended. BPS spent $350,000 for equipment and introduced 350 Apple II's into seven high schools, five middle schools and one elementary school. This program served only 8 percent of the school population but was considered by school officials when it was put into place in September 1982 as "a quantum leap forward" from what had gone before.

And "what had gone before" gives substance to Sen. Frank Lautenberg's recent remarks on computer education.

Gardner remembers computer classes during the 1981-82 school year as "hit or miss" in terms of quality. Seventeen different programs were scattered among the 120 schools. There was no coordination or standardization. Available computers were primarily on a time-shared basis with Boston City Hall. And 96 percent of the students in the system did not have access to a computer.

October, 1981, marked the beginnings of what will take shape through 1986.

It was in that month that 20 teachers who taught computer courses in the system met at the Hubert H. Humphrey Occupational Resource Center in Roxbury. "Many of them were meeting each other for the first time," Gardner recalls. "Some of them didn't even know each other existed."

The 20 formed the Boston Public School Computer Education Association (BPS CEA) and produced a position paper described by Gardner as "where we were, where we wanted to be, and how we wanted to get there."

In February, 1982, they met with School Superintendent Robert Spillane, the Boston School Committee and other senior school officials. "They became quite excited about our proposals," Gardner says, "and agreed to extend to us $225,000 of school-targeted federal funds."

The funds, which eventually totaled $350,000, came from Public Law 94-482, which provides vocational money; federal block grants set aside for school programs; and Chapter 636, which provides for special desegregation plans. The computer program was seen as providing job opportunities for inner-city minority students, anticipating Lautenberg's remarks by more than a year.

From these small beginnings, which loomed so large at the time, has come not only the three-year financial plan but a 25 member BPS Computer Policy Committee and BPS computer instruction certification requirements, all created this past winter and spring.

The policy committee, which will oversee the three-year plan, breaks down into six subcommittees:

Professional development

Curriculum development

Maintenance/security

Student/parent issues

School-based management/administration

Hardware procurement

BPS CEA is under the Professional Development Committee. Since October, 1981, BPS CEA has grown to 350 members. It promotes itself as "an educational organization devoted to increasing the effectiveness of education through technology . . . [to provide] its members [with] the broadest possible exchange of computer technology experiences through meetings, publications and other services."

At its May, 1983 meeting, held appropriately enough in the Enterprise Room of the State Street Bank of Boston, the keynote speaker was Dr. Seymour Papert, who has more than a passing interest in the computer teachers' association and in BPS's three-year computer plan. Papert, internationally-known author and lecturer, is a pioneer in Artificial Intelligence and the creator of LOGO. Professor of Mathematics and Cecil and Ida Green Professor of Education at the Massachusetts Institute of Technology, he wrote the book, *Mindstorms. Children, Computers and Powerful Ideas*, which drew international attention to Papert's theories when it was published in 1980. In *Mindstorms* Papert said:

"In many schools today, the phrase 'computer-aided instruction' means making the computer teach the child. One might say the computer is being used to program the child. In my vision, the child programs the computer and, in doing so, both acquires a sense of mastery over a piece of the most modern and powerful technology and establishes an intimate contact with some of the deepest ideas from science, from mathematics, and from the art of intellectual model building."

This helps explain why Papert will be researching the BPS computer literacy program for insights on how a computer-rich learning environment is created.

BPS administrators and teachers have been engaged in an ambitious program of professional development which includes graduate instruction, seminars and workshops. In just the period from January through June, 1983, a total of 256 teachers and administrators spent $67,750 out of their own pockets for computer-related courses at Lesley College, Bridgewater State College, Northeastern University and the University of Massachusetts.

These graduate courses covered such areas as basic programming, introduction to computer literacy, LOGO (the graphic language developed by Papert and his colleagues at the Artificial Intelligence Laboratory at MIT), and professional uses of computers in education.

Responding to BPS teachers' demands for more courses, the universities worked with the system to meet this demand. Out of this came Lesley College's "Computers in Education." Initiated by the District V Teachers Center, it had an overwhelming response and a long waiting list. Gardner says it was one of the first M.A. programs of its kind in the state.

In January, Northeastern began offering "Professional Uses of the Computer" for four graduate credits; the classes were held at Madison Park High School in Roxbury, right next door to the Hubert H. Humphrey Occupational Resource Center where the historic October, 1981 computer teachers' meeting was held.

Some 1000 teachers and administrators also attended workshops and seminars during the school year.

Although the teachers had taken the lead in introducing computers to school children, the private sector has not been totally inactive. Digital Equipment Corp. not only conducted training workshops, it supported the embryonic computer program in two other ways. A DEC bus full of computer equipment visited schools in the system that didn't have any. DEC assigned one of its executives, Mike Odom, to work for three years as a full-time consultant to the program.

EPIE, a computer software evaluation company, held a workshop that focused on ways the teacher could improve their capacities to identify and purchase quality software.

Teachers have already shown that they are eager to learn as well as teach, mostly by the enthusiastic response to any opportunity to learn about computers. Professional upgrading plays an important part in computer teacher certification.

The first such certification requirements for any public school system in the Commonwealth and, Gardner thinks, what may be the first in the nation, were laid out in the Spring. BPS announced in a systems-wide memorandum:

"With the rapid expansion of computer education in Boston schools, the Boston School Department has developed a Boston Computer Instructor Certification. Since the Boston schools need to ensure that they have the qualified staff to implement the extensive expansion effort which is unfolding, the Boston certification is intended to encourage Boston school personnel to retrain in an area where a critical shortage of qualified teachers now exists."

Among the requirements, which take effect July 1, 1984, are:

Fifteen credits in Computer Science/Education from an accredited university or technical school. (A minimum of three credits may be waived if an instructor has computer teaching experience equivalent to three years.)

A maximum of three computer in-service credits may be applied toward the 15-credit requirement.

Acceptable courses for certification include:

Introduction to Computers/Computers in Education

Introduction to Computers

Introduction to Management Information Systems

Introduction to Word Processing

Use of Computers in Education

Computers in Society

Introduction to Operating Systems

Creating an Educational Environment with LOGO

Computers and the Special-Needs Student

Evaluation and Design of Educational Software

Computers in the Schools: Applied Uses for Teachers, Administrators, and Specialists

Integrating Microcomputers into the Math Curriculum

Programming (Minimum of six credits)

Programming in BASIC

Programming in PASCAL

Programming in LOGO

Programming in COBOL

Programming in FORTRAN

Programming in ASSEMBLY

Computer Science (Maximum of three credits)

Technical and Business Writing

Learning Writing Through Technology

Professional Uses of the Computer

Software Engineering

Office Automation

Artificial Intelligence

Information Systems for Computers

Computer Structure: Fundamentals of Organization and Operation

Fundamentals of Computer Structure

Systems Analysis and Design

Management of Data-Processing Systems

Computer Science and Information Systems

Computer Analysis of Data

Computer Architecture

The memorandum noted that in anticipation of a substantial increase in the number and variety of computer courses offered through universities in the next few years,

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By Rick Friedman,

[illegible], July 7, 1983.

the course listing would change from time to time. Also, that the certification requirements would be reviewed by BPS' Department of Personal and Labor Relations in June, 1984. This was because upgrading and revision of the requirements might be necessary considering the constant flux and advancement of computer technology.

Teachers applying for certification with courses not described above could send a course-catalog description with their certification application for approval as the list was not all inclusive.

The computer program has already inspired computer clubs and contests in the schools. This past semester Richard Tendrollis at Copley High School won a $75 savings bond in the "Graphics" division for his entry, "Satellite." It simulated the launching, weightlessness and splashdown of the Space Shuttle Columbia.

Andrew Baker of South Boston High School won the runner-up $50 savings bond in the "Graphics" division for "Elvis," which had the late and famous rock star on the screen singing "Love Me Tender."

Computer camps are a part of the program. They will run for six weeks in July and August, two sessions a day of four hours each. Computer awareness will be emphasized.

Parental support has been integrated into the program. Parents are welcome to take computer training at the school. Those with at least twelve hours of training are permitted to borrow computers and take them home just as they would library books. This past semester 80 parents were trained on how to use computers. Twenty-five of them had 12 hours or more of extensive training and were permitted to borrow the computers.

When the students return in the fall some 18,000 of them will be meeting LOGO graphics, BASIC and PASCAL. A LOGO environment will be waiting for those at the elementary level.

From K through 12 there will be a core curriculum for minimum competence and electives for further study. Curriculum development is going on right now.

Students will also be taught how to repair and maintain equipment, not only preparing them for jobs when they graduate but eventually saving BPS money on this budget line item.

Minimum competency will be required at the ends of the fifth, eighth and twelfth grades (a graduation computer competency). At the kindergarten level the students will learn to read by using computers and IBM Selectric typewriters. On the screen will be spelled out such words as "dog." The students will type the words on the Selectric and a print-out will give it back to them.

At the other end of the learning spectrum, high school seniors will be completing their training in such job-related areas as automated accounting, word processing and programming.

Gardner says the computer program is turning the much-maligned school system around. She claims it is cutting student absenteeism, stimulating renewed teacher interest and slowing the student exodus to private schools.

Gardner calls the computer a motivational tool. "Instant feedback," she says. "No peer pressure. A one-to-one relationship between the student and the computer."

Gardner points out, "The student makes a mistake, 30 classmates don't see it; there is no fear of being embarrassed when asking the computer a question."

Gardner claims the computer program is helping diminish the problem of "teacher burn-out" "Teachers are excited about something new," she says, "and are even buying their own Apple II microcomputers, the model that first went into the system in 1982, for their own use."

Gardner even thinks the program might help people make better parents. "Parents are taking a renewed interest in what their children are learning," Gardner says.

Mrs. Christine Whittemore had a son, Brian, in the Trotter Elementary School kindergarten last fall. He was her first child entering school; she also has a daughter, Megan, age 22 months. Until Mrs. Whittemore heard about the computer training program she had planned to put Brian in private school when he entered first grade.

"I was amazed when I first heard about the computer program at a parents' meeting before school started," she recalls. "Not only is the computer program a factor in keeping Brian in public school, so is the enthusiasm of teachers.

"When our kids grow up, they might not become keypunch operators but in whatever they do they will have to be computer literate."

Brian Whittemore, meet Sen. Frank Lautenberg. Boston schools could well be on their way to illustrating what the nation's schools should be doing, rather than — as it has been accused for some years — the plight of the poorest.